CIRCUIT DESCRIPTION

CD-1C240-02
ISSUE 4B
APPENDIX ISSUE 3B
DWG ISSUE 10B
DISTN CODE 1N99

9

COMMON SYSTEMS
SIGNALING
APPLICATION SCHEMATIC AND BAY WIRING FOR FU( ) PLUS AUXILIARY UNITS FOR USE IN TYPE F SIGNALING SYSTEM

CHANGES

D. Description of Changes

D.1 Option N is added in Option Index.

D.2 In FS1, CAD 1, and CAD 2 lead designations are changed for option Q leads.

D.3 Note 2 is added in FS3 for -48V lead wire requirements.

D.4 Leads X and Y from FS5 to FS6 are made option N. Option N is rated Mfr Disc. in Note 104.

D.5 Note 314 is added to allow locally engineered alarm connections. Reference to Note 314 is added to alarm leads in FS3, FS6 and CAD 8.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4162-LIC-JL

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D. Description of Changes

D.1 Added Option Q to option index and FS1. This option provides interconnection for the FUD 2600 Hz Converter with gain transfer network.

D.2 Added circuit note 111.

D.3 Added equipment note 205 and information note 313F.

F. Changes in CD Section II

F.1 Removed in paragraphs 6.02(b) "ALM lamp on supply is extinguished."

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D.3 In CAD 6 and 12, ground A continuation from terminal 1 to 8 is removed.

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COMMON SYSTEMS
SIGNALING
APPLICATION SCHEMATIC AND BAY WIRING FOR FU( ) PLUS AUXILIARY UNITS FOR USE IN TYPE F SIGNALING SYSTEM

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides information pertaining to the use and compatibility of the dual unit type F signaling system.

1.02 Bay wiring information is also provided for the following:

(a) Type FU( ) 2600-Hz converter circuit and type F auxiliary signaling circuits such as FA( ), FB( ), FC( ), FD( ), FG( ), FH( ), FL( ), FM( ), FP( ), FR( ), and FS( ).

(b) Fuse and Alarm Circuit.

(c) 2600-Hz Tone Supply and Transfer Circuit.

(d) Power Systems, Regulated Converter, 48- to 24-Volt DC Circuit.

(e) Carrier Group Alarm Control Circuit.

(f) Input Power Circuit Breaker.

2. GENERAL DESCRIPTION OF OPERATION

2.01 Type F signaling is a 2600-Hz signaling system used to transform dc supervisory and dial pulse signals into ac tone signals for transmittal over 4-wire line or carrier facilities. It then converts the ac tone signals into dc signals for use by electromechanical switching circuits.

2.02 The type F signaling system is similar in purpose to the type E signaling system which, in most application, it replaces and with which it is electrically compatible.

2.03 The fuse and alarm circuit provides circuitry for actuating the minor and major audible and visual office alarm when the signaling unit, tone supply, ringing, or regulated converter fuses fail. It also provides a talk battery filter as well as a high and low voltage detection circuit for signal voltage.

2.04 The tone supply and transfer circuit provides the 2600-Hz oscillator for use by the signaling circuits. The transfer portion of the circuit will switch the full load to either of two oscillators, normally provided, and actuate the office alarm if preset limits are exceeded.

2.05 The 48- to 24-volt dc regulated converter provides controlled power for operating the signaling units and tone supplies. The converter reduces the effect of 48-volt battery office noise and limits the variations in voltage, thus providing more stable operation of the signal detector and speech amplifier. In addition, the voltage converter helps to isolate the 2600-Hz tone from the 48-volt supply. A circuit breaker is provided to disable the entire bay.

2.06 The carrier group alarm control circuit provides a means of activating the trunk release and make-busy features in the signaling unit when carrier failure occurs.

SECTION II - DETAILED DESCRIPTION

1. FUNCTIONAL SCHEMATICS

FS1 SIGNALING CIRCUIT

1.01 FS1 provides connecting information between the combination of FU( ) and F auxiliary signaling units and the line facility, the switching equipment, the power source, the 2600-Hz tone source, and the carrier group alarm control circuit. Option Z provides a local ground connection to the signaling unit for the E lead when working with trunk circuits not requiring looped signaling leads. The SB lead provides battery through a 500-ohm resistor for the M lead when working with trunk circuits requiring looped signaling leads. Option Y provides wiring for an external echo suppressor or equalizer.

1.02 If a signaling unit should fail, it can be removed and replaced by another unit. If doubt exists as to whether the unit or the connecting circuit is at fault, the test extender circuit, SD-1C241-02, can be used to examine the input and output ports and the control leads.

FS2 DUAL TONE SUPPLY AND TRANSFER CIRCUIT

1.03 FS2 shows the interconnection of two 2600-Hz tone supplies (odd and even) and their associated transfer circuits. Each oscillator has two outputs (first and second groups) and can provide sufficient 2600-Hz power for 72 circuits (a full bay), but normally supplies tone to only 36 units or less. If either supply should fail to meet its preset limits, the transfer circuit will function, releasing either the TRA or TRB relay (explained presently) which switches all signaling units to the good oscillator and causes the office alarm to be actuated.

1.04 An alarm lamp will light on the faulty oscillator. If the failure were caused by a momentary change of the preset limits, it may possibly restore itself to normal or it may be restored by pressing the RST button associated with the lamp. If the lamp remains on, the faulty supply may be removed without interruption of service as it is a plug-in device. When the new supply is inserted, its lamp will light and should extinguish automatically in a short interval or can be restored to normal by pressing the RST button.

1.05 In addition to the lighting of the alarm lamp on the faulty oscillator, all signaling units are switched to the good supply and a minor alarm is activated. These latter functions occur when either of the normally operated TRA and TRB relays (FS2) release. The TRA or TRB relay will release if battery is removed from either the odd or even supply, respectively, or if the TR relay in either supply operates removing battery. Release of either TRA or TRB will transfer the tone source and will connect battery to the MN relay in the fuse and alarm circuit, thus operating it. Operation of MN closes contacts to the minor alarm. If, for any reason, both tone supplies fail, or if battery is lost to both supplies, the TRA and TRB relays will release, operating the MJ relay in the fuse and alarm circuit which activates the major alarm. The MN relay would not be operated under this condition.

1.06 An alarm cutoff key (ACO) is provided on the panel of the dual-tone supply and transfer circuit. When operated, it will silence the minor alarm and light an ACO lamp indicating where the defective supply is or was removed from. A major alarm can be released only by replacing one of the defective supplies or by restoring battery to either or both supplies. A major alarm will be activated if only one supply is in place and it fails. When the defective supply is replaced with a good one and restored to normal (or the second defective supply is replaced as in the case of a major alarm), a minor alarm will sound once again if the ACO key is still operated. The alarm will be restored and the ACO lamp extinguished when the key is returned to normal (See 6. ALARM ROUTINES).

FS3 BAY FUSE AND ALARM CIRCUIT

1.07 FS3 shows the connections to the fuse and alarm circuit and to the 48- to 24-volt power converter. The fuse and alarm circuit provides fuses between the office -48 volt SIG supply and the power converters, the TB leads, the RS leads, the CGA control circuit, and the alarm relays. It also provides fuses between the power converter and the signaling units and the oscillators. In addition to the fuses, there are alarm lamps, relays, and keys which provide minor or major failure indications. A master circuit breaker (MCB-1) with a set of back contacts is also provided to provide protection mainly for the fuse and alarm circuit. It may also be used to knock down power for the entire bay. MCB-1 back contacts are wired in parallel with make contact 3 of the MJ relay in the Fuse & Alarm panel to provide an alarm to the Centralized Status Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

1.08 The 48- to 24-volt power converter is a plug-in device which provides the 24 volts necessary for operating the signaling units and oscillators. Each converter can provide power for a maximum of 24 signaling units and one oscillator. There can be a maximum of three converters per bay. If a converter fails to produce the preset voltage limits or fails because its input fuse blows, a major alarm will be sounded. If a fuse on the output of the converter should blow, a minor alarm will be sounded. In addition to the minor alarm, a major alarm will also be sounded if the power failure (PF) fuse blows.

1.09 As previously mentioned, the TB lead has 48-volt battery on it. This is a filtered voltage which is used for talk battery in the auxiliary unit. In addition, it is the 48-volt source for the SB lead described in 1.01.

FS4 (MFR DISC) CARRIER GROUP ALARM CONTROL CIRCUIT

1.10 The carrier group alarm control unit (FYG) is a plug-in unit which may be provided to permit activation of the trunk (circuit) release and make-busy features of the various auxiliary units. It accepts a dc ground from N carrier and a loop closure from the A6 channel bank as indication of carrier terminal status from an associated carrier alarm and restoral circuit on a single lead per group of 12 circuits. It translates this into control information for up to 12 associated auxiliary units located on two adjacent shelves in the bay. The control unit provides all common functions necessary for proper trunk conditioning. This unit is intended for use initially with type N systems using the SD-97244-01 alarm circuit but may be used with any future carrier system planned which provides the necessary status information output.

1.11 Included in the control unit is an alarm override key and lamp circuit which may be selected by auxiliary unit option control, to permit patching of equipment during an alarm condition. The lamp circuit provides an indication of key operation. A similar key providing the same function may be remotely located by connection to appropriate bay terminals.

1.12 Relay GA( ) mounted external to the CGA unit is included in FS4. This relay provides carrier failure alarm indication for the ESS remote master scanner applique circuit.

FS5 INDIVIDUAL TONE SUPPLY AND TRANSFER CIRCUIT, FS6 INDIVIDUAL FUSE AND ALARM CIRCUIT AND CONVERTER

1.13 When only a few circuits are required, not exceeding 12, the J99335F shelf arrangement may be used. This shelf uses one tone supply (per FS5) and a fuse and alarm circuit with one -48 to -24 volt power converter (per FS6). The only purpose of the transfer circuit associated with the tone supply is to provide an alarm control if the tone supply should exceed its limits. The fuse and alarm circuit not only provides protection for the -48, -24 volt, and 20-Hz ringing but also monitors the output of the 48- to 24-volt power converter for proper voltage limits and will bring in an alarm if they are exceeded. Master circuit breaker (MCB-1) with a set of back contacts is also provided to provide protection mainly for the fuse and alarm circuit. It may also be used to knock down power for the entire drawer. MCB-1 back contacts are wired in parallel with make contact 3 of the M J relay in the fuse & alarm panel to provide an alarm to the Centralized Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

FS7 CARRIER GROUP ALARM CONTROL CIRCUIT

1.14 FS7 is electrically similar to FS4 except that the make contacts for the ESS remote master scanner are provided in the FYH unit. The GA( ) relays have been removed.

2. CAD FIG.

2.01 CADs 1 and 2 provide connecting information from the signaling units to the transmission, signaling, battery, tone leads, and switching equipment.

2.02 CAD 3 provides the connecting information to the regulated converter.

2.03 CAD 4 provides connecting information from the 2600-Hz supply and transfer circuit to the fuse and alarm circuit and to the signaling units, and also to Centralized Status Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

2.04 CAD 5 (Mfr. Disc.) provides the connecting information to the carrier group alarm common control circuit.

2.05 CADs 6 or 12 and 8 or 13 provide bay terminal strip connecting information to the transmission facility and alarm leads, respectively.

2.06 CADs 7, 9, and 15 provide cross connections via distribution frame.

2.07 CAD 10 provides hard-wire connecting information to the transmission facility.

2.08 CAD 11 provides connecting information for split frame appearances, and also to Centralized Status Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

2.09 CAD 14 provides connecting information for the CGA to ESS remote master scanner applique circuit.

2.10 CAD 16 provides for a cross connect to ESS remote master scanner.

2.11 CAD 17 provides for parallel 26-gauge wire for non-looped E and M signaling.

2.12 CAD 18 provides connecting information between a carrier with a loop closure to indicate a failure and the CGA unit code FYH.

2.13 CAD 19 provides the connecting information to the Carrier Group alarm control circuit.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Working limits are provided in the circuit description of each circuit.

2. FUNCTIONAL DESIGNATIONS

2.01 Leads

Designation	Meaning
ACO	Alarm cutoff
CGA	Carrier group alarm
GA	Group alarm
MCB1	Master Circuit Breaker
OS	Oscillator (2600-Hz supply)
PC	Power converter
RS	Ringing source
S	Signaling unit
SB	Signal battery or M lead return
SG	Signal ground or E lead return
TB	Talk battery
TG	Tone ground
TN, TS	2600-Hz tone

2.02 Leads or straps used for local interconnections on the signaling units or tone supply are generally described in their respective circuit descriptions.

3. FUNCTIONS

3.01 The major and minor alarm leads shown on this drawing are controlled by the fuse and alarm Circuit or the Tone supply and transfer circuit, and are described in their CDs.

4. CONNECTING CIRCUITS

4.01 The following circuits are covered by this drawing.

(a) 2600-Hz Tone Supply and Transfer Circuit - SD-1C224-01.

(b) Type F Signaling Circuits - see Compatibility Information added on SD-1C240-02, Issue 7B.

(c) Fuse and Alarm Circuit - SD-1C239-02.

(d) Carrier Group Alarm Common Control Circuit - SD-1C284-01.

(e) Regulated Converter - SD-81868-01.

(f) Application Schematic and Bay Wiring - SD-1C240-01.

4.02 The following are typical connecting circuits.

(a) For switching equipment trunk circuits, see Signaling Compatibility with Switching Circuits - SD-99421-08.

(b) For type E signaling units, see Application Schematic - SD-98151-01.

(c) TT Board Patching Jack Circuits - SD-55337-01, SD-62741-01, and SD-64724-01.

(d) Carrier Application Schematics - SD-59106-01, SD-64360-01, SD-97031-01, SD-97118-01, and SD-97118-02.

(e) Carrier Systems VF Patching Jack Circuit - SD-64303-01, SD-59329-01, and SD-59330-01.

(f) Carrier Group Alarm Control Circuit - SD-97166-01.

(g) Consolidated Bay with Maintenance Connector Circuit - SD-1C375-01.

(h) ESS No.1 Remote Master Scanner Applique Circuit - SD-1A210-01.

(i) V3 or V4 Telephone Repeater Application Schematic - SD-95144-01 and SD-97047-01.

(j) 24V4 Repeater - SD-99739-01.

(k) Test Extender Circuit - SD-1C241-02.

(l) DX Signaling Circuit - SD-95487-01, SD-1C363-01, and SD-1C364-01.

(m) L- Type Multiplex 12 Channel Bank - Type A6 - SD-53121-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 None.

6. ALARM ROUTINES

6.01 The following procedures are to be used when an alarm is activated by failure of the tone supply and transfer circuit. The alarm routines to be followed in case of failure of a power converter or fuse are described in SD-1C239-02 and its associated circuit description.

6.02 Minor Alarm: When a minor alarm sounds and the source of trouble is a defective tone supply as indicated by a lighted ALM lamp which cannot be extinguished when the RST button is depressed:

(a) Operate ACO key, ACO lamp lights and minor alarm is silenced.

(b) Remove defective supply. ALM lamp on supply is extinguished.

(c) Insert good supply. ALM lamp lights and may restore itself. Minor alarm may sound if ALM lamp goes out.

(d) If ALM lamp remains lighted, press RST button. ALM lamp is extinguished and minor alarm sounds.

(e) Release ACO key. ACO lamp is extinguished and minor alarm is silenced.

6.03 Major Alarm: When a major alarm sounds and the source of trouble is a pair of defective tone supplies in one bay:

(a) Remove at least one defective supply.

(b) Insert good supply. ALM lamp lights and may restore itself. Major alarm may be silenced, causing minor alarm to sound.

(c) If ALM lamp remains lighted, press RST button. ALM lamp is extinguished, the major alarm silenced, and the minor alarm sounds.

(d) Operate ACO key. ACO lamp lights and the minor alarm is silenced.

(e) If only one spare supply is available, the second defective supply may be left in place until it can be replaced.

(f) When the second good supply is available, follow the procedures of 6.02, beginning with (b).

6.04 Alarm for Individual Supply: When an alarm sounds for the individual tone supply and it cannot be extinguished when the RST button is depressed:

(a) Remove defective supply. Alarm continues.

(b) Insert good supply. ALM lamp lights and may restore itself. Alarm continues as long as ALM lamp is lit.

(c) If ALM lamp remains lit, press RST button. ALM lamp should be extinguished and the alarm silenced.

7. TAKING EQUIPMENT OUT OF SERVICE

7.01 When troubles arise in the signaling unit or associated connections which cannot be repaired easily by replacing the signaling unit, it may be possible to localize the trouble by using the Test Extender Circuit (SD-1C241-02). This circuit makes the input and output ports and the control leads available for easy testing.

SECTION IV - REASON FOR REISSUE

B. Changes in Apparatus (Components)

Added

MCB1 Circuit Breaker KS-1581 L107, FS3, App. Fig. 7.

MCB1 Circuit Breaker KS-1581 L103, FS6, App. Fig. 8.

D. Description of Changes

D.1 20A circuit breaker, CBA1 (Options 7 and R), is added to FS3.

D.2 20A circuit breaker, CBA1 (Options 8 and R), is added to FS6.

D.3 In FS1 reference is made to FM( ) and SD-1C296-01 on the converter circuit, and to SD-1C296-01 and SD-1C153-01 on the auxiliary circuit.

D.4 FS4, APP. FIG. 3, and CAD 5 are rated Mfr. Disc.

D.5 FS4, APP. FIG. 3, and CAD 19 are added.

D.6 In FS6 Option T is added for CSACS and SCOTS.

D.7 Notes 1, 2, 3 and respective references on App. Fig's 1, 3, and 5 are removed.

D.8 APP FIGS 7 and 8 are added to include circuit breakers.

D.9 Reference to options 3 and 9 and associated location is added to Option Index.

D.10 Options 6, 7, 8, R, and S are added to option table.

D.11 Option 6, GA(1-6) relay with associated break contacts is made Mfr. Disc. in FS4, App Fig 6, and Note 104.

D.12 MS and EG designations are removed from SB and SG leads, respectively.

D.13 ES, EB, MA, and MB lead designations are removed from CAD's 2,6,9,10,11, and 12.

D.14 In CAD 6 and CAD 12 dotted strap connection between terminals 8 and 1 are added.

D.15 "E" symbol is removed from CAD11, upper two rows only. (error)

D.16 In CAD 13 ground strap between terminals 8 and 1 is added.

D.17 In CAD 13 "to FYA corr grp alm ckt" is changed to read "corr. grp. alarm ckt AC02 light & keep". (error).

D.18 CAD 15 is further defined as providing ground for Carrier Alarm Circuit.

D.19 CAD 18 is added in order to show stepping necessary at the distributing frame to provide the ground for the carrier alarm lead.

D.20 Reference to CAD 19 is added to CAD's 2, 13, and 14.

D.21 Note 101 is added in order to reference circuit breaker.

D.22 In Note 102 reference to Note 310 and APP Fig. 9 by CGA positions is added.

D.23 Note 104 is revised to include options 6,7,8, and R. Option 9 is added as std. and option 3 is added as mfr disc.

D.24 Note 202 is deleted.

D.25 Note 305 is revised to reflect lead designation changes.

D.26 Notes 309, 310, and 311 are added.

NOTE: This reissue also covers information authorized by the following appendixes to Issue 3D of this CD.

APPX 1B - DWG ISS 4B

APPX 2B - DWG ISS 5B

APPX 3A - DWG ISS 6A

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 4162 - LIC - RPC

CIRCUIT DESCRIPTION

CD-1C240-02
ISSUE 4B
APPENDIX ISSUE 3B
DWG ISSUE 10B
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DEPT 4162-LIC-JL

CIRCUIT DESCRIPTION

CD-1C240-02
ISSUE 4B
APPENDIX ISSUE 2B
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DISTN CODE 1N99

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D.3 Added equipment note 205 and information note 313F.

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BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4162-LIC-JL

CIRCUIT DESCRIPTION

CD-1C240-02
ISSUE 4B
APPENDIX 1B
DWG ISSUE 8B

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(a) Type FU( ) 2600-Hz converter circuit and type F auxiliary signaling circuits such as FA( ), FB( ), FC( ), FD( ), FG( ), FH( ), FL( ), FM( ), FP( ), FR( ), and FS( ).

(b) Fuse and Alarm Circuit.

(c) 2600-Hz Tone Supply and Transfer Circuit.

(d) Power Systems, Regulated Converter, 48- to 24-Volt DC Circuit.

(e) Carrier Group Alarm Control Circuit.

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2. GENERAL DESCRIPTION OF OPERATION

2.01 Type F signaling is a 2600-Hz signaling system used to transform dc supervisory and dial pulse signals into ac tone signals for transmittal over 4-wire line or carrier facilities. It then converts the ac tone signals into dc signals for use by electromechanical switching circuits.

2.02 The type F signaling system is similar in purpose to the type E signaling system which, in most application, it replaces and with which it is electrically compatible.

2.03 The fuse and alarm circuit provides circuitry for actuating the minor and major audible and visual office alarm when the signaling unit, tone supply, ringing, or regulated converter fuses fail. It also provides a talk battery filter as well as a high and low voltage detection circuit for signal voltage.

2.04 The tone supply and transfer circuit provides the 2600-Hz oscillator for use by the signaling circuits. The transfer portion of the circuit will switch the full load to either of two oscillators, normally provided, and actuate the office alarm if preset limits are exceeded.

2.05 The 48- to 24-volt dc regulated converter provides controlled power for operating the signaling units and tone supplies. The converter reduces the effect of 48-volt battery office noise and limits the variations in voltage, thus providing more stable operation of the signal detector and speech amplifier. In addition, the voltage converter helps to isolate the 2600-Hz tone from the 48-volt supply. A circuit breaker is provided to disable the entire bay.

2.06 The carrier group alarm control circuit provides a means of activating the trunk release and make-busy features in the signaling unit when carrier failure occurs.

SECTION II - DETAILED DESCRIPTION

1. FUNCTIONAL SCHEMATICS

FS1 SIGNALING CIRCUIT

1.01 FS1 provides connecting information between the combination of FU( ) and F auxiliary signaling units and the line facility, the switching equipment, the power source, the 2600-Hz tone source, and the carrier group alarm control circuit. Option Z provides a local ground connection to the signaling unit for the E lead when working with trunk circuits not requiring looped signaling leads. The SB lead provides battery through a 500-ohm resistor for the M lead when working with trunk circuits requiring looped signaling leads. Option Y provides wiring for an external echo suppressor or equalizer.

1.02 If a signaling unit should fail, it can be removed and replaced by another unit. If doubt exists as to whether the unit or the connecting circuit is at fault, the test extender circuit, SD-1C241-02, can be used to examine the input and output ports and the control leads.

FS2 DUAL TONE SUPPLY AND TRANSFER CIRCUIT

1.03 FS2 shows the interconnection of two 2600-Hz tone supplies (odd and even) and their associated transfer circuits. Each oscillator has two outputs (first and second groups) and can provide sufficient 2600-Hz power for 72 circuits (a full bay), but normally supplies tone to only 36 units or less. If either supply should fail to meet its preset limits, the transfer circuit will function, releasing either the TRA or TRB relay (explained presently) which switches all signaling units to the good oscillator and causes the office alarm to be actuated.

1.04 An alarm lamp will light on the faulty oscillator. If the failure were caused by a momentary change of the preset limits, it may possibly restore itself to normal or it may be restored by pressing the RST button associated with the lamp. If the lamp remains on, the faulty supply may be removed without interruption of service as it is a plug-in device. When the new supply is inserted, its lamp will light and should extinguish automatically in a short interval or can be restored to normal by pressing the RST button.

1.05 In addition to the lighting of the alarm lamp on the faulty oscillator, all signaling units are switched to the good supply and a minor alarm is activated. These latter functions occur when either of the normally operated TRA and TRB relays (FS2) release. The TRA or TRB relay will release if battery is removed from either the odd or even supply, respectively, or if the TR relay in either supply operates removing battery. Release of either TRA or TRB will transfer the tone source and will connect battery to the MN relay in the fuse and alarm circuit, thus operating it. Operation of MN closes contacts to the minor alarm. If, for any reason, both tone supplies fail, or if battery is lost to both supplies, the TRA and TRB relays will release, operating the MJ relay in the fuse and alarm circuit which activates the major alarm. The MN relay would not be operated under this condition.

1.06 An alarm cutoff key (ACO) is provided on the panel of the dual-tone supply and transfer circuit. When operated, it will silence the minor alarm and light an ACO lamp indicating where the defective supply is or was removed from. A major alarm can be released only by replacing one of the defective supplies or by restoring battery to either or both supplies. A major alarm will be activated if only one supply is in place and it fails. When the defective supply is replaced with a good one and restored to normal (or the second defective supply is replaced as in the case of a major alarm), a minor alarm will sound once again if the ACO key is still operated. The alarm will be restored and the ACO lamp extinguished when the key is returned to normal (See 6. ALARM ROUTINES).

FS3 BAY FUSE AND ALARM CIRCUIT

1.07 FS3 shows the connections to the fuse and alarm circuit and to the 48- to 24-volt power converter. The fuse and alarm circuit provides fuses between the office -48 volt SIG supply and the power converters, the TB leads, the BS leads, the CGA control circuit, and the alarm relays. It also provides fuses between the power converter and the signaling units and the oscillators. In addition to the fuses, there are alarm lamps, relays, and keys which provide minor or major failure indications. A master circuit breaker (MCB-1) with a set of back contacts is also provided to provide protection mainly for the fuse and alarm circuit. It may also be used to knock down power for the entire bay. MCB-1 back contacts are wired in parallel with make contact 3 of the MJ relay in the Fuse & Alarm panel to provide an alarm to the Centralized Status Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

1.08 The 48- to 24-volt power converter is a plug-in device which provides the 24 volts necessary for operating the signaling units and oscillators. Each converter can provide power for a maximum of 24 signaling units and one oscillator. There can be a maximum of three converters per bay. If a converter fails to produce the preset voltage limits or fails because its input fuse blows, a major alarm will be sounded. If a fuse on the output of the converter should blow, a minor alarm will be sounded. In addition to the minor alarm, a major alarm will also be sounded if the power failure (PF) fuse blows.

1.09 As previously mentioned, the TB lead has 48-volt battery on it. This is a filtered voltage which is used for talk battery in the auxiliary unit. In addition, it is the 48-volt source for the SB lead described in 1.01.

FS4 (MFR DISC) CARRIER GROUP ALARM CONTROL CIRCUIT

1.10 The carrier group alarm control unit (FYG) is a plug-in unit which may be provided to permit activation of the trunk (circuit) release and make-busy features of the various auxiliary units. It accepts a dc ground from N carrier and a loop closure from the A6 channel bank as indication of carrier terminal status froe an associated carrier alarm and restoral circuit on a single lead per group of 12 circuits. It translates this into control information for up to 12 associated auxiliary units located on two adjacent shelves in the bay. The control unit provides all common functions necessary for proper trunk conditioning. This unit is intended for use initially with type N systems using the SD-97244-01 alarm circuit but may be used with any future carrier system planned which provides the necessary status information output.

1.11 Included in the control unit is an alarm override key and lamp circuit which may be selected by auxiliary unit option control, to permit patching of equipment during an alarm condition. The lamp circuit provides an indication of key operation. A similar key providing the same function may be remotely located by connection to appropriate bay terminals.

1.12 Relay GA( ) mounted external to the CGA unit is included in FS4. This relay provides carrier failure alarm indication for the ESS remote master scanner applique circuit.

FS5 INDIVIDUAL TONE SUPPLY AND TRANSFER CIRCUIT, FS6 INDIVIDUAL FUSE AND ALARM CIRCUIT AND CONVERTER

1.13 When only a few circuits are required, not exceeding 12, the J99335F shelf arrangement may be used. This shelf uses one tone supply (per FS5) and a fuse and alarm circuit with one -48 to -24 volt power converter (per FS6). The only purpose of the transfer circuit associated with the tone supply is to provide an alarm control if the tone supply should exceed its limits. The fuse and alarm circuit not only provides protection for the -48, -24 volt, and 20-Hz ringing but also monitors the output of the 48- to 24-volt power converter for proper voltage limits and will bring in an alarm if they are exceeded. Master circuit breaker (MCB-1) with a set of back contacts is also provided to provide protection mainly for the fuse and alarm circuit. It may also be used to knock down power for the entire drawer. MCB-1 back contacts are wired in parallel with make contact 3 of the M J relay in the fuse & alarm panel to provide an alarm to the Centralized Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

FS7 CARRIER GROUP ALARM CONTROL CIRCUIT

1.14 FS7 is electrically similar to FS4 except that the make contacts for the ESS remote master scanner are provided in the FYH unit. The GA( ) relays have been removed.

2. CAD FIG.

2.01 CADs 1 and 2 provide connecting information from the signaling units to the transmission, signaling, battery, tone leads, and switching equipment.

2.02 CAD 3 provides the connecting information to the regulated converter.

2.03 CAD 4 provides connecting information from the 2600-Hz supply and transfer circuit to the fuse and alarm circuit and to the signaling units, and also to Centralized Status Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

2.04 CAD 5 (Mfr. Disc.) provides the connecting information to the carrier group alarm common control Circuit.

2.05 CADs 6 or 12 and 8 or 13 provide bay terminal strip connecting information to the transmission facility and alarm leads, respectively.

2.06 CADs 7, 9, and 15 provide cross connections via distribution frame.

2.07 CAD 10 provides hard-wire connecting information to the transmission facility.

2.08 CAD 11 provides connecting information for split frame appearances, and also to Centralized Status Alarm and Control System (CSACS) and Surveillance Control of Transmission System (SCOTS).

2.09 CAD 14 provides connecting information for the CGA to ESS remote master scanner applique circuit.

2.10 CAD 16 provides for a cross connect to ESS remote master scanner.

2.11 CAD 17 provides for parallel 26-gauge wire for non-looped E and M signaling.

2.12 CAD 18 provides connecting information between a carrier with a loop closure to indicate a failure and the CGA unit code FYH.

2.13 CAD 19 provides the connecting information to the Carrier Group alarm control circuit.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Working limits are provided in the circuit description of each circuit.

2. FUNCTIONAL DESIGNATIONS

2.01 Leads

Designation	Meaning
ACO	Alarm cutoff
CGA	Carrier group alarm
GA	Group alarm
MCB1	Master Circuit Breaker
OS	Oscillator (2600-Hz supply)
PC	Power converter
RS	Ringing source
S	Signaling unit
SB	Signal battery or M lead return
SG	Signal ground or E lead return
TB	Talk battery
TG	Tone ground
TN, TS	2600-Hz tone

2.02 Leads or straps used for local interconnections on the signaling units or tone supply are generally described in their respective circuit descriptions.

3. FUNCTIONS

3.01 The major and minor alarm leads shown on this drawing are controlled by the fuse and alarm Circuit or the Tone supply and transfer circuit, and are described in their CDs.

4. CONNECTING CIRCUITS

4.01 The following circuits are covered by this drawing.

(a) 2600-Hz Tone Supply and Transfer Circuit - SD-1C224-01.

(b) Type F Signaling Circuits - see Compatibility Information added on SD-1C240-02, Issue 7B.

(c) Fuse and Alarm Circuit - SD-1C239-02.

(d) Carrier Group Alarm Common Control Circuit - SD-1C284-01.

(e) Regulated Converter - SD-81868-01.

(f) Application Schematic and Bay Wiring - SD-1C240-01.

4.02 The following are typical connecting circuits.

(a) For switching equipment trunk circuits, see Signaling Compatibility with Switching Circuits - SD-99421-08.

(b) For type E signaling units, see Application Schematic - SD-98151-01.

(c) TT Board Patching Jack Circuits - SD-55337-01, SD-62741-01, and SD-64724-01.

(d) Carrier Application Schematics - SD-59106-01, SD-64360-01, SD-97031-01, SD-97118-01, and SD-97118-02.

(e) Carrier Systems VF Patching Jack Circuit - SD-64303-01, SD-59329-01, and SD-59330-01.

(f) Carrier Group Alarm Control Circuit - SD-97166-01.

(g) Consolidated Bay with Maintenance Connector Circuit - SD-1C375-01.

(h) ESS No.1 Remote Master Scanner Applique Circuit - SD-1A210-01.

(i) V3 or V4 Telephone Repeater Application Schematic - SD-95144-01 and SD-97047-01.

(j) 24V4 Repeater - SD-99739-01.

(k) Test Extender Circuit - SD-1C241-02.

(l) DX Signaling Circuit - SD-95487-01, SD-1C363-01, and SD-1C364-01.

(m) L- Type Multiplex 12 Channel Bank - Type A6 - SD-53121-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 None.

6. ALARM ROUTINES

6.01 The following procedures are to be used when an alarm is activated by failure of the tone supply and transfer circuit. The alarm routines to be followed in case of failure of a power converter or fuse are described in SD-1C239-02 and its associated circuit description.

6.02 Minor Alarm: When a minor alarm sounds and the source of trouble is a defective tone supply as indicated by a lighted ALM lamp which cannot be extinguished when the RST button is depressed:

(a) Operate ACO key, ACO lamp lights and minor alarm is silenced.

(b) Remove defective supply. ALM lamp on supply is extinguished.

(c) Insert good supply. ALM lamp lights and may restore itself. Minor alarm may sound if ALM lamp goes out.

(d) If ALM lamp remains lighted, press RST button. ALM lamp is extinguished and minor alarm sounds.

(e) Release ACO key. ACO lamp is extinguished and minor alarm is silenced.

6.03 Major Alarm: When a major alarm sounds and the source of trouble is a pair of defective tone supplies in one bay:

(a) Remove at least one defective supply.

(b) Insert good supply. ALM lamp lights and may restore itself. Major alarm may be silenced, causing minor alarm to sound.

(c) If ALM lamp remains lighted, press RST button. ALM lamp is extinguished, the major alarm silenced, and the minor alarm sounds.

(d) Operate ACO key. ACO lamp lights and the minor alarm is silenced.

(e) If only one spare supply is available, the second defective supply may be left in place until it can be replaced.

(f) When the second good supply is available, follow the procedures of 6.02, beginning with (b).

6.04 Alarm for Individual Supply: When an alarm sounds for the individual tone supply and it cannot be extinguished when the RST button is depressed:

(a) Remove defective supply. Alarm continues.

(b) Insert good supply. ALM lamp lights and may restore itself. Alarm continues as long as ALM lamp is lit.

(c) If ALM lamp remains lit, press RST button. ALM lamp should be extinguished and the alarm silenced.

7. TAKING EQUIPMENT OUT OF SERVICE

7.01 When troubles arise in the signaling unit or associated connections which cannot be repaired easily by replacing the signaling unit, it may be possible to localize the trouble by using the Test Extender Circuit (SD-1C241-02). This circuit makes the input and output ports and the control leads available for easy testing.

SECTION IV - REASON FOR REISSUE

B. Changes in Apparatus (Components)

Added

MCB1 Circuit Breaker KS-1581 L107, FS3, App. Fig. 7.

MCE1 Circuit Breaker KS-1581 L103, FS6, App. Fig. 8.

D. Description of Changes

D.1 20A circuit breaker, CBA1 (Options 7 and B), is added to FS3.

D.2 20A circuit breaker, CBA1 (Options 8 and B), is added to FS6.

D.3 In FS1 reference is made to FM( ) and SD-1C296-01 on the converter circuit, and to SD-1C296-01 and SD-1C153-01 on the auxiliary circuit.

D.4 FS4, APP. FIG. 3, and CAD 5 are rated Mfr. Disc.

D.5 FS4, APP. FIG. 3, and CAD 19 are added.

D.6 In FS6 Option T is added for CSACS and SCOTS.

D.7 Notes 1, 2, 3 and respective references on App. Fig's 1, 3, and 5 are removed.

D.8 APP FIGS 7 and 8 are added to include circuit breakers.

D.9 Reference to options 3 and 9 and associated location is added to Option Index.

D.10 Options 6, 7, 8, R, and S are added to option table.

D.11 Option 6, GA(1-6) relay with associated break contacts is made Mfr. Disc. in FS4, App Fig 6, and Note 104.

D.12 MS and EG designations are removed from SB and SG leads, respectively.

D.13 ES, EB, MA, and MB lead designations are removed from CAD's 2,6,9,10,11, and 12.

D.14 In CAD 6 and CAD 12 dotted strap connection between terminals 8 and 1 are added.

D.15 "E" symbol is removed from CAD11, upper two rows only. (error)

D.16 In CAD 13 ground strap between terminals 8 and 1 is added.

D.17 In CAD 13 "to FYA corr grp alm ckt" is changed to read "corr. grp. alarm ckt AC02 light & keep". (error).

D.18 CAD 15 is further defined as providing ground for Carrier Alarm Circuit.

D.19 CAD 18 is added in order to show stepping necessary at the distributing frame to provide the ground for the carrier alarm lead.

D.20 Reference to CAD 19 is added to CAD's 2, 13, and 14.

D.21 Note 101 is added in order to reference circuit breaker.

D.22 In Note 102 reference to Note 310 and APP Fig. 9 by CGA positions is added.

D.23 Note 104 is revised to include options 6,7,8, and R. Option 9 is added as std. and option 3 is added as mfr disc.

D.24 Note 202 is deleted.

D.25 Note 305 is revised to reflect lead designation changes.

D.26 Notes 309, 310, and 311 are added.

NOTE: This reissue also covers information authorized by the following appendixes to Issue 3D of this CD.

APPX 1B - DWG ISS 4B

APPX 2B - DWG ISS 5B

APPX 3A - DWG ISS 6A

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